



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/756,997 | 01/08/2001 | Caroline Boulenger | FR919990065 | 6885 |

32074 7590 10/21/2003

INTERNATIONAL BUSINESS MACHINES CORPORATION
DEPT. 18G
BLDG. 300-482
2070 ROUTE 52
HOPEWELL JUNCTION, NY 12533

EXAMINER

NOVACEK, CHRISTY L

| | |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
|----------|--------------|

2822

DATE MAILED: 10/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/756,997

Applicant(s)

BOULENGER, CAROLINE

Examiner

Christy L. Novacek

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☒ Claim(s) 5 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 16.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

This Office Action is in response to the request for continued examination filed August 21, 2003 and the amendment filed September 17, 2003.

Drawings

The corrected drawings were received on August 26, 2003. These drawings are approved.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 17, 2003 has been entered.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art in view of Suzuki (JP 06-196397, cited in IDS).

Regarding claim 1, the admitted prior art discloses providing a semiconductor wafer (11) having a photoresist layer (16) formed thereon, and exposing, baking and developing the photoresist layer to produce a patterned photoresist mask (pg. 2, ln. 3-pg. 3, ln. 6). The admitted prior art developing process includes the steps of depositing the developer at a temperature of 22

Art Unit: 2822

degrees Celsius and then rinsing the substrate with deionized water that is also 22 degrees Celsius. The admitted prior art does not disclose heating the wafer to 100-140 degrees Celsius and then rinsing the wafer without cooling it. Like the admitted prior art, Suzuki discloses a process of developing a photoresist that has been deposited onto a semiconductor substrate. Suzuki teaches that it is advantageous to heat both the substrate and the water to a temperature of around 100 degrees Celsius during the rinsing step because heating the rinsing water and the substrate reduces the surface tension of the water and thereby, the surface tension exerted on the resist mask is reduced, which prevents the resist mask from collapsing or becoming distorted. At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the rinsing process of the admitted prior art by heating the substrate and then, without cooling it, rinsing the substrate with the deionized water at an elevated temperature of around 100 degrees Celsius because Suzuki teaches that by heating the substrate and the water, defects in the resist mask can be prevented.

Regarding claim 2, the admitted prior art discloses that the semiconductor wafer comprises silicon (pg. 2, ln. 11).

Regarding claims 3 and 4, Suzuki discloses that the step of heating the substrate is conducted after the developer has been deposited onto the substrate and the rinsing water is applied to the substrate immediately thereafter.

Allowable Subject Matter

The indicated allowability of claims 1-5 is withdrawn in view of the newly discovered reference(s) of Suzuki (JP 06-196397), submitted in the IDS filed on August 21, 2003.

Claim 5 is objected to as being dependent upon a rejected base claim, but would be

Art Unit: 2822

allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The primary reason for the indication of the allowable subject matter of claim 5 is the inclusion therein, in combination as currently claimed, of the limitation of heating the substrate to a temperature of 140 degrees Celsius during the post-development baking step. This limitation is found in claim 5 and is neither disclosed nor taught by the prior art of record, alone or in combination. Suzuki discloses that the post-development bake step should be conducted at a temperature near the vaporization temperature of the rinsing liquid. Both the admitted prior art and Suzuki disclose using a rinsing liquid of water (vaporization temperature of about 100 degrees Celsius). Therefore, Suzuki does not teach or suggest using a baking temperature of 140 degrees Celsius.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christy L. Novacek whose telephone number is (703) 308-5840. The examiner can normally be reached on Monday-Thursday and alternate Fridays 7:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (703) 308-4905. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

CLN
October 8, 2003


AMIR ZARABIAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800